

IN THE CLAIMS:

Please cancel Claims 1-9 without prejudice to or disclaimer of the subject matter presented therein.

Please amend Claims 21, 23, 25 and 27 as follows.

1-9. (Canceled)

10. (Original) An image processing apparatus which converts multilevel image data into frequency component data for each pixel block of a predetermined size to compression-code the multilevel image data, and multiplexes noise on the multilevel image to embed visible additional information with a noise-multiplexed distribution, comprising:

input means for inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block or the predetermined size;

determination means for determining on the basis of the input additional information whether a pixel block of interest is located at a position where noise is to be multiplexed;

specifying means for, when said determination means determines that the pixel block of interest is located at the position where noise is to be multiplexed, specifying a bit region where noise is to be multiplexed in data constituting a converted low frequency component of the pixel block of interest on the basis of a reference region serving as a converted low frequency component of a neighboring pixel block near the pixel block of interest; and

change means for reversibly changing bit information for the bit region in the data of the low frequency component specified by said specifying means.

11. (Original) An image processing apparatus which converts multilevel image data into frequency component data for each pixel block of a predetermined size to compression-code the multilevel image data, and multiplexes noise on the multilevel image to embed visible additional information with a noise-multiplexed distribution, comprising:

input means for inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block of the predetermined size;

determination means for determining on the basis of the input additional information whether a pixel block of interest is located at a position where noise is to be multiplexed;

specifying means for, when said determination means determines that the pixel block of interest is located at the position where is to be multiplexed, specifying a bit region where noise is to be multiplexed in data constituting a low frequency component of the pixel block of interest on the basis of a reference region serving as a converted high frequency component of the pixel block of interest; and

change means for reversibly changing bit information for the bit region in the data of the low frequency component specified by said specifying means.

12. (Original) The apparatus according to claim 10, wherein the conversion into the frequency component includes orthogonal transform, and the low frequency component includes a DC component after orthogonal transform.

13. (Original) The apparatus according to claim 12, wherein the conversion into the frequency component includes wavelet transform, and the low frequency component includes data of a block of a low frequency component that is generated by wavelet transform a plurality of number of times.

14. (Original) The apparatus according to claim 10, further comprising means for setting information on an intensity for multiplexing noise, and

said specifying means specifies the bit region where noise is to be multiplexed at the low frequency component of the pixel block of interest on the basis of the set information on the intensity and the reference region.

15. (Original) An image processing apparatus which removes visible additional information from multilevel image data that is compression-coded by reversibly embedding noise, multiplexing the visible additional information, and converting the data into frequency component data for each pixel block of a predetermined size, comprising:

input means for inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block of the predetermined size;

determination means for determining on the basis of the input additional information whether a pixel block of interest is located at a position where noise is multiplexed;

specifying means for, when said determination means determines that the pixel block of interest is located at the position where noise is multiplexed, specifying a bit region where noise is multiplexed at a converted low frequency component of the pixel block of interest on the basis of a reference region serving as a converted low frequency component of a neighboring pixel block near the pixel block of interest; and

reconstructing means for performing conversion inverse to noise multiplexing to reconstruct a state of the bit region at the low frequency component of the pixel block of interest specified by said specifying means into a state before multiplexing.

16. (Original) An image processing apparatus which removes visible additional information from multilevel image data that is compression-coded by reversibly embedding noise, multiplexing the visible additional information, and converting the data into frequency component data for each pixel block of a predetermined size, comprising:

input means for inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block of the predetermined size;

determination means for determining on the basis of the input additional information a pixel block of interest is located at a position where noise is multiplexed;

specifying means for, when said determination means determines that the pixel block of interest is located at the position where noise is multiplexed, specifying a bit region where noise is multiplexed at a low frequency component of the block of interest on the basis of a reference region serving as a converted high frequency component of the pixel block of interest; and

reconstructing means for performing conversion inverse to noise multiplexing to reconstruct a state of the bit region at the low frequency component of the pixel block of interest specified by said specifying means into a state before multiplexing.

17. (Original) An image processing method of converting multilevel image data into frequency component data for each pixel block of a predetermined size to compression-code the multilevel image data, and multiplexing noise on the multilevel image to embed visible additional information with a noise-multiplexed distribution, comprising:

an input step of inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block of the predetermined size;

a determination step of determining on the basis of the input additional information whether a pixel block of interest is located at a position where noise is to be multiplexed;

a specifying step of, when the pixel block of interest is determined in the determination step to be located at the position where noise is to be multiplexed, specifying a bit region where noise is to be multiplexed in data constituting a converted low frequency component of the pixel block of interest on the basis of a reference region serving as a converted low frequency component of a neighboring pixel block near the pixel block of interest; and

a change step of reversibly changing bit information for the bit region in the data of the low frequency component specified in the specifying step.

18. (Original) An image processing method of converting multilevel image data into frequency component data for each pixel block of a predetermined size to compression-code the

multilevel image data, and multiplexing noise on the multilevel image to embed visible additional information with a noise-multiplexed distribution, comprising:

an input step of inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block of the predetermined size;

a determination step of determining on the basis of the input additional information whether a pixel block of interest is located at a position where noise is to be multiplexed;

a specifying step of, when the pixel block of interest is determined in the determination step to be located at the position where noise is to be multiplexed, specifying a bit region where noise is to be multiplexed in data constituting a low frequency component of the pixel block of interest on the basis of a reference region serving as a converted high frequency component of the pixel block of interest; and

a change step of reversibly changing bit information for the bit region in the data of the low frequency component specified in the specifying step.

19. (Original) An image processing method of removing visible additional information from multilevel image that is compression-coded by reversibly embedding noise, multiplexing the visible additional information, and converting the data into frequency component data for each pixel block of a predetermined size, comprising:

an input step of inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block of the predetermined size;

a determination step of determining on the basis of the input additional whether a pixel block of interest is located at a position where noise is multiplexed;

a specifying step of, when the pixel block of interest is determined in the determination step to be located at the position where noise is multiplexed, specifying a bit region where noise is multiplexed at a converted low frequency component of the pixel block of interest on the basis of a reference region serving as a converted low frequency component of a neighboring pixel block near the pixel block of interest; and

a reconstruction step of performing conversion inverse to noise multiplexing to reconstruct a state of the bit region at the low frequency component of the pixel block of interest specified in the specifying step into a state before multiplexing.

20. (Original) An image processing method of removing visible additional information from multilevel image data that is compression-coded by reversibly embedding noise, multiplexing the visible additional information, and converting the data into frequency component data into frequency component data for each pixel block of a predetermined size, comprising:

an input step of inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block of the predetermined size;

a determination step of determining on the basis of the input additional information whether a pixel block of interest is located at a position where noise is multiplexed;

a specifying step of, when the pixel block of interest is determined in the determination step to be located at the position where noise is multiplexed, specifying a bit region where noise is multiplexed at a low frequency component of the block of interest on the basis of a reference region serving as a converted high frequency component of the pixel block of interest; and

a reconstruction step of performing conversion inverse to noise multiplexing to reconstruct a state of the bit region at the low frequency component of the pixel block of interest specified in the specifying step into a state before multiplexing.

21. (Currently Amended) A computer program-functioning, embodied in a computer-readable medium, for causing an apparatus to function as an image processing apparatus which converts multilevel image data into frequency component data for each pixel block of a predetermined size to compression-code the multilevel image data, and multiplexes noise on the multilevel image to embed visible additional information with a noise-multiplexed distribution, the apparatus functioning as:

input means for inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block of the predetermined size;

determination means for determining on the basis of the input additional information whether a pixel block of interest is located at a position where noise is to be multiplexed;

specifying means for, when said determination means determines that the pixel block of interest is located at the position where noise is to be multiplexed, specifying a bit region where noise is to be multiplexed in data constituting a converted low frequency component of the pixel block of interest on the basis of a reference region serving as a converted low frequency component of a neighboring pixel block near the pixel block of interest; and

change means for reversibly changing bit information for the bit region in the data of the low frequency component specified by said specifying means.

22. (Original) A computer-readable storage medium storing a computer program defined in claim 21.

23. (Currently Amended) A computer program~~functioning~~, embodied in a computer-readable medium, for causing an apparatus to function as an image processing apparatus which converts multilevel image data into frequency component data for each pixel block of a predetermined size to compression-code the multilevel image data, and multiplexes noise on the multilevel image to embed visible additional information with a noise-multiplexed distribution, the apparatus functioning as:

input means for inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block of the predetermined size;

determination means for determining on the basis of the input additional information whether a pixel block of interest is located at a position where noise is to be multiplexed;

specifying means for, when said determination means determines that the pixel block of interest is located at the position where noise is to be multiplexed, specifying a bit region where noise is to be multiplexed in data constituting a low frequency component of the pixel block of interest on the basis of a reference region serving as a converted high frequency component of the pixel block of interest; and

change means for reversibly changing bit information for the bit region in the data of the low frequency component specified by said specifying means.

24. (Original) A computer-readable storage medium storing a computer program defined in claim 23.

25. (Currently Amended) A computer program, embodied in a computer-readable medium, for causing an apparatus to function~~functioning~~ as an image processing apparatus which removes visible additional information from multilevel image data that is compression-coded by reversibly embedding noise, multiplexing the visible additional information, and converting the data into frequency component data for each pixel block of a predetermined size, the apparatus functioning as:

input means for inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block of the predetermined size;

determination means for determining on the basis of the input additional information whether a pixel block of interest is located at a position where noise is multiplexed;

specifying means for, when said determination means determines that the pixel block of interest is located at the position where noise is multiplexed, specifying a bit region where noise is multiplexed at a converted low frequency component of the pixel block of interest on the basis of a reference region serving as a converted low frequency component of a neighboring pixel block near the pixel block of interest; and



reconstruction means for performing conversion inverse to noise multiplexing to reconstruct a state of the bit region at the low frequency component of the pixel block of interest specified by said specifying means into a state before multiplexing.

26. (Original) A computer-readable storage medium storing a computer program defined in claim 25.

27. (Currently Amended) A computer program, embodied in a computer-readable medium, for causing an apparatus to function-functioning as an image processing apparatus which removes visible additional information from multilevel image data that is compression-coded by reversibly embedding noise, multiplexing the visible additional information, and converting the data into frequency component data for each pixel block of a predetermined size, the apparatus functioning as:

input means for inputting, as the additional information, information representing whether or not to multiplex noise for each pixel block of the predetermined size;

determination means for determining on the basis of the input additional information whether a pixel block of interest is located at a position where noise is multiplexed;

specifying means for, when said determination means determines that the pixel block of interest is located at the position where noise is multiplexed, specifying a bit region where noise is multiplexed at a low frequency component of the block of interest on the basis of a reference region serving as a converted high frequency component of the pixel block of interest; and

reconstruction means for performing conversion inverse to noise multiplexing to reconstruct a state of the bit region at the low frequency component of the pixel block of interest specified by said specifying means into a state before multiplexing.

28. (Original) A computer-readable storage medium storing a computer program defined in claim 27.